IS 8422-5 (1977): Piston rings for IC engines, Part 5: Stepped oil scraper rings from 30 up to 200 mm nominal diameter Z-Rings [TED 2: Automotive Primemovers]

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UDC 621·43-242·3

Indian Standard (Reaffirmed 2000)

SPECIFICATION FOR PISTON RINGS FOR IC ENGINES

PART V STEPPED OIL SCRAPER RINGS FROM 30 UP TO 200 mm NOMINAL DIAMETER

Z-RINGS

Internal Combustion Engines Sectional Committee, EDC 14 ; Piston Assembly Components Subcommittee, EDC 14 : 1 [Ref : Doc : EDC 14 (2637)]

1. Scope — Specifies the dimensions, tolerances, tangential loads and other details of Z-rings (stepped oil scraper rings) from 30 up to 200 mm nominal diameter for internal combustion engines.

2. Dimensions and Tolerances — Shall be as given in Table 1 read along with Fig. 1.

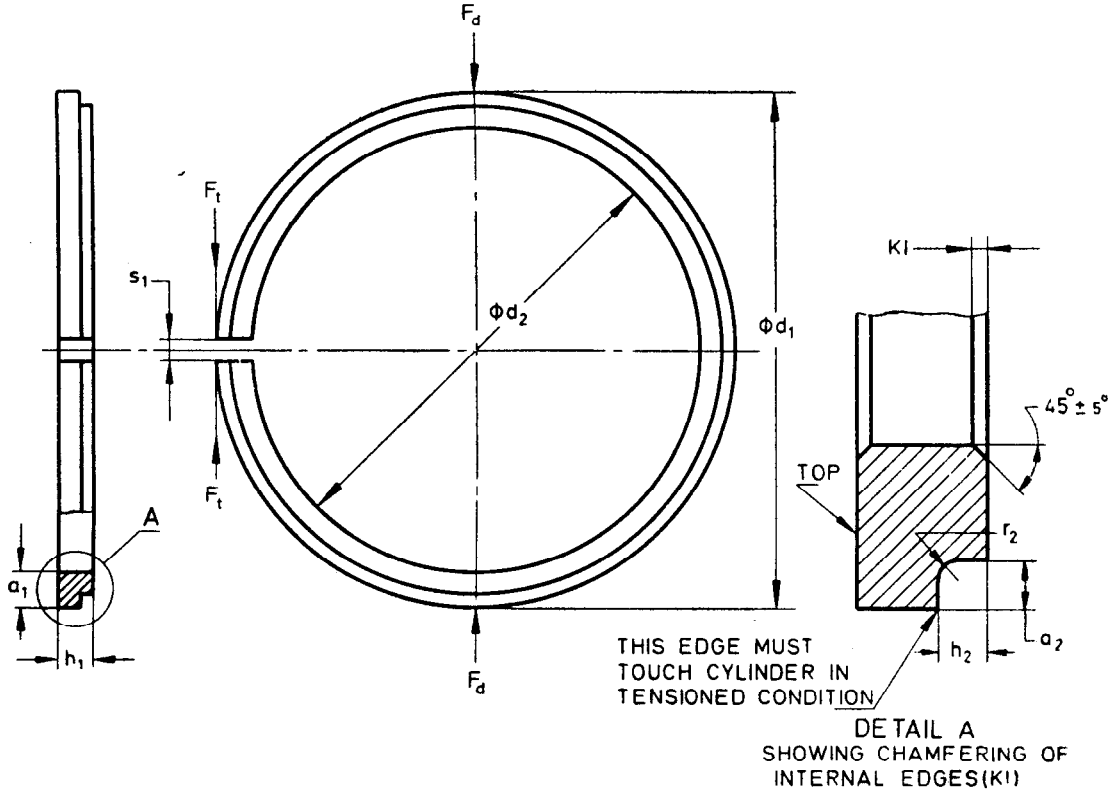

FIG. 1 STEPPED OIL SCRAPER RING (Z-RING)

3. Designation — Shall include:

a) Type of ring;
b) Nominal diameter, d_1;
c) Axial width, h_1;
d) Number of this standard;
e) Material symbol;
f) Whether internally bevelled;
g) Manufacturing process; and
h) Type of coating.

Example:

Stepped oil scraper ring (Z-ring) of nominal diameter d_1=90 mm, axial width h_1 =2·5 mm, made of alloyed cast iron (A3), internally bevelled (IF) and phosphated on all sides (P), shall be designated as:

Z-ring 90×2·5 IS : 8422 (Part V) A3 IF P

Adopted 20 June 1977

INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
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TABLE 1 DIMENSIONS AND LOADS OF Z-RINGS

(*Clause* 2, and *Fig.* 1)

(All dimensions in millimetres)

Nominal Diameter	Inside Diameter	Radial Wall Thickness		Axial Width of Ring h_1 −0·010 −0·025			Closed Gap	Axial Width of Step h_2±0·1 for h_1 Shown in Column			Radial Depth of Step	Radius	Chamfering of Inside Edges	Diametral Load F_d* in N±25% for h_1 Shown in Column		
d_1	d_2	a_1	Tol	1	2	3	s_1	1	2	3	a_2	r_2	KI	1	2	3
30	27·5	1·25	±0·10 −0·15 with a maximum variation of 0·15 in a ring	2	2·5	—	$0·15^{+0·20}_{0}$	0·6	0·7	—	0·4±0·1	0·25 *Max*	0·3 *Max*	8·9	11·1	—
32	29·3	1·35												9·9	12·7	
34	31·1	1·45												10·9	13·8	
35	32·1	1·45												10·3	13·1	
36	33	1·5												10·9	13·5	
38	34·8	1·6									0·5±0·1			11·5	14·8	
40	36·6	1·7												12·7	16·0	
42	38·5	1·75												12·5	15·8	
44	40·3	1·85												13·5	17·2	
45	41·2	1·9					$0·20^{+0·20}_{0}$				0·6±0·1			13·8	17·4	
46	42·1	1·95												14·4	18·2	
48	44·0	2·0												14·2	18·0	
														Tangential Load F_t* in N±20% for h_1 Shown in Column		
														1	2	3
50	45·8	2·1	±0·10 −0·20 with a maximum variation of 0·15 in a ring	2	2·5	—	$0·20^{+0·20}_{0}$	0·6	0·7	—	0·6±0·1	0·25 *Max*	0·3 *Max*	7·4	9·4	—
52	47·6	2·2												7·9	10·0	
53	48·5	2·25												8·2	10·2	
54	49·4	2·3									0·7±0·1			8·3	10·5	
55	50·4	2·3												8·0	10·1	
56	51·3	2·35												8·3	10·4	
58	53·1	2·45												8·8	11·0	
60	54·9	2·55												9·2	11·7	—
62	56·8	2·6												9·1	11·5	13·7
63	57·7	2·65												9·3	11·8	14·1
64	58·6	2·7												9·6	12·1	14·5
65	59·5	2·75				3	$0·25^{+0·20}_{0}$			0·9	0·8±0·1			9·8	12·4	14·8
66	60·4	2·8												10·0	12·6	15·2
67	61·4	2·8												9·7	12·2	14·7
68	62·3	2·85												9·9	12·6	15·0
70	64·1	2·95												10·4	13·2	15·8
72	65·9	3·05												10·9	13·8	16·5
74	67·8	3·1												10·9	13·8	16·5
75	68·7	3·15		2·5	3	—	$0·30^{+0·20}_{0}$	0·7	0·9	—	0·9±0·1			14·0	16·7	—
76	69·6	3·2												14·3	17·1	
78	71·4	3·3												14·8	17·7	

80 82 84	73·3 75·1 76·9	3·35 3·45 3·55	+0·10 −0·25 with a maximum variation of 0·18 in a ring	2·5	3	—	$0.30^{+0.20}_{0}$	0·7	0·9	—	1±0·1	0·25 *Max*	0·45 *Max*	14·7 15·2 15·8	17·6 18·2 19·1	—
85 86 88	77·8 78·8 80·6	3·6 3·6 3·7												16·2 15·8 16·4	19·4 18·9 19·7	
90 92 94	82·4 84·2 86·1	3·8 3·9 3·95				3·5	$0.40^{+0.25}_{0}$			1·2	1·1±0·1			16·9 17·6 17·4	20·3 21·0 20·8	23·6 24·4 24·4
95 96 98	87·0 87·9 89·7	4 4·05 4·14									1·2±0·1			17·7 18·0 18·5	21·3 21·6 22·3	24·8 25·3 26·0
100 102 104	91·6 93·4 95·4	4·2 4·3 4·3												18·4 19·0 18·2	22·1 22·8 21·8	25·8 26·5 25·4
105 106 108	96·1 97·0 99·0	4·45 4·5 4·5												19·9 20·2 19·3	23·8 24·2 23·1	27·8 28·2 27·0
110 112 114	100·8 102·6 104·6	4·6 4·7 4·7		3	3·5	—		0·9	1·2	—	1·3+0·1			23·6 24·3 23·3	27·6 28·4 27·2	—
115 116 118	105·4 106·4 108·2	4·8 4·8 4·9												24·4 24·0 24·5	28·6 28·0 28·6	
120 122 124	110·0 112·0 114·0	5 5 5									1·4±0·1			25·2 24·1 23·3	29·2 28·2 27·2	
125 126 128	114·6 115·6 117·6	5·2 5·2 5·2				4	$0.50^{+0.25}_{0}$			1·3			0·55 *Max*	25·9 25·5 24·5	30·2 29·6 28·6	34·7 34·2 32·9
130 132 134	119·2 121·2 123·2	5·4 5·4 5·4									1·5±0·1			26·5 25·6 24·7	30·9 29·8 28·9	35·6 34·5 33·3
135 136 138	124·0 125·0 127·0	5·5 5·5 5·5												25·8 25·3 24·5	30·1 29·6 28·6	34·7 34·1 32·9
140 142 144	128·6 130·6 132·6	5·7 5·7 5·7		3·5	4	—		1·2	1·3	—	1·6±0·15			30·8 29·8 28·8	35·5 34·4 33·3	—
145 146 148	133·2 134·2 136·2	5·9 5·9 5·9												31·7 31·2 30·2	36·5 35·9 34·8	

(*Continued*)

TABLE 1 DIMENSIONS AND LOADS OF Z-RINGS — *Contd*

(All dimensions in millimetres)

Nominal Diameter	Inside Diameter	Radial Wall Thickness		Axial Width of Ring h_1 −0·010 −0·025			Closed Gap	Axial Width of Step h_2±0·1 for h_1 Shown in Column			Radial Depth of Step	Radius	Chamfering of Inside Edges	Tangential Load F_t* in N±20% for h_1 Shown in Column		
d_1	d_2	a_1	Tol	1	2	3	s_1	1	2	3	a_2	r_2	KI	1	2	3
150	138·0	6·0												30·7	35·4	
152	140·0	6·0									1·7±0·15			29·8	34·4	
154	142·0	6·0												28·9	33·3	
155	142·6	6·2												31·6	36·4	
156	143·6	6·2												31·1	35·8	
158	145·6	6·2	+0·10 −0·25 with a maximum variation of 0·18 in a ring			—								30·2	34·7	
160	147·2	6·4										0·25 *Max*		32·2	37·2	
162	149·2	6·4					0·60 +0·25 0						0·55 *Max*	31·3	36·1	
164	151·2	6·4												30·4	35·0	—
165	152·0	6·5									1·8±0·2			31·6	36·3	
166	153·0	6·5												31·0	35·8	
168	155·0	6·5												30·2	34·8	
170	156·6	6·7												32·1	37·2	
172	158·6	6·7		3·5	4			1·2	1·3					31·3	36·1	
174	160·6	6·7												30·4	35·0	
175	161·2	6·9												32·9	38·0	43·1
176	162·2	6·9									1·9±0·2			32·5	37·5	42·5
178	164·2	6·9												31·7	36·5	41·4
180	165·8	7·1												33·7	38·9	44·1
182	167·8	7·1												32·9	37·9	42·9
184	169·8	7·1												32·0	37·0	42·0
185	170·6	7·2	+0·15 −0·30 with a maximum variation of 0·23 in a ring							1·45				32·8	37·9	43·0
186	171·6	7·2												32·4	37·4	42·3
188	173·6	7·2				4·5	0·70 +0·25 0						0·8 *Max*	31·7	36·5	41·4
190	175·2	7·4												33·7	38·8	44·0
192	177·2	7·4										0·5 *Max*		32·8	37·8	42·8
194	179·2	7·4									2±0·2			32·0	37·0	42·0
195	180·0	7·5												33·0	38·0	43·1
196	181·0	7·5												32·6	37·7	42·8
198	183·0	7·5												31·9	36·7	41·5
200	184·6	7·7												33·8	38·9	44·1

Note — Tangential force F_t and diametral load F_d values in col 1, 2 and 3 correspond to the values of h_1 given in col 1, 2 and 3 respectively.

* Tangential and diametral load values are applicable for material A1 only [*see* IS : 5791-1977 Technical supply conditions for piston rings for IC engines (*first revision*)]. For other materials load factors given in IS : 5791-1977 shall be used.

4. General Requirements — Shall be as given in IS : 5791-1977.

5. Marking — The rings which are to be fitted in a particular direction shall be marked with the word 'TOP' on the top sides of the rings. For other markings reference should be made to IS : 5791-1977.

5.1 *ISI Certification Marking* — Details available with the Indian Standards Institution.

EXPLANATORY NOTE

This standard is one of the series of Indian Standards on piston ring dimensions, tangential force, etc. IS : 5791-1977 is a necessary adjunct to this standard which gives details of materials, surface finish, gap types and sizes, surface coatings, manufacturing processes, etc.

In the preparation of this standard due consideration has been given to the prevalent sizes in the industry. It is recommended that for new designs, only the sizes given in this standard be used.

In the preparation of this standard assistance has been derived from 'Draft British Standard Specification of piston rings up to 200 mm diameter for internal combustion engines: Part I Single piece designs, dimensions, materials and designations', issued by the British Standards Institution.

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